Listing of Claims:

1-37. (Cancelled)

38. (New) A method for determining the viability of a signal path of a wavelength through a communication network, comprising:

defining a performance matrix by identifying at least one performance metric measuring interference effects on the wavelength along the signal path;

identifying a unidirectional path of the wavelength through a plurality of nodes interconnected by segments of optic fibre;

calculating an initial value of the performance matrix by analyzing interference effects on the wavelength;

for each of the plurality of nodes along the unidirectional path,

identifying an upstream segment on the unidirectional path, and recalculating a value of the performance matrix by analyzing interference effects on the wavelength in the upstream segment, and analyzing interference effects on the wavelength at the node; and

for each upstream segment connected to the node on the wavelength other than the upstream segment on the unidirectional path, recalculating the value of the performance matrix by identifying a transmitter node of the upstream segment on the wavelength, and analyzing interference effects on the wavelength while the signal passes through the transmitter node to the upstream segment;

at a receiver node, comparing the value of the performance matrix against an acceptable threshold to determine the viability of the signal path;

wherein analyzing interference effects on the wavelength comprises identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

39. (New) The method according to claim 38 wherein the at least one identified base variable is one or more of a fibre type, a length of segment, a number of wavelengths, a length for each fibre span within a segment, and a power level input into each span.

40. (New) The method according to claim 38 wherein the at least one identified optical effect is a distortion effect.

41. (New) The method according to claim 40 wherein the at least one identified dominant source is one or more of dispersion, self-phase modulation, cross-phase modulation, and four-wave mixing.

42. (New) The method according to claim 38 where the at least one identified optical effect is a noise effect.

43. (New) The method according to claim 42 wherein the at least one identified dominant source is one or more of amplified spontaneous emission, stimulated Brillouin scattering, stimulated Raman scattering, and multi-path interference.

44. (New) The method according to claim 38 wherein the at least one performance metric is measured by one or more of bit error rate, optical signal-to-noise ratio, Q, and penalty points.

45. (New) In a communications network comprising a plurality of nodes interconnected by segments of optical fibre, an apparatus at a node comprising:

a receiver for receiving from a upstream node along a wavelength path a value of a performance matrix that identifies at least one performance metric measuring interference effects on a wavelength along a signal path;

a calculator for recalculating the value of the performance matrix by analyzing interference effects on the wavelength in each of upstream segments on the wavelength and analyzing interference effects on the wavelength at the node;

a comparator for determining if the resulting value of the performance matrix satisfies an acceptable threshold to determine the viability of the signal path;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

46. (New) The apparatus of claim 45 wherein the node is an OAM (Operations, Administration and Maintenance) node associated with the network.

47. (New) In a communications network comprising a plurality of nodes interconnected by segments of optical fibre, a transmitter node, interconnected with at least one downstream node by a downstream segment along which an apparatus is adapted to send signals, comprising:

a quantifier for defining a performance matrix by identifying at least one performance metric measuring inference effects on a wavelength along a signal path;

a calculator for calculating a value of the performance matrix by analyzing interference effects at the node; and

a communicator for communicating the resulting performance matrix along at least one downstream segment to the corresponding downstream node;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

48. (New) The apparatus of claim 47, wherein the value of the performance matrix is communicated along an OSC channel in the segment.

49. (New) In a communications network comprising a plurality of nodes interconnected by segments of optical fibre, an intermediate node interconnected with at least one upstream node by an upstream segment from along which an apparatus is adapted to receive signals and with at least one downstream node by a downstream segment along which it is adapted to send signals, comprising:

a receiver for receiving from a upstream node along a wavelength path a value of a performance matrix that identifies at least one performance metric measuring interference effects on a wavelength along a signal path;

a calculator for recalculating the value of the performance matrix by analyzing interference effects on the wavelength in each of upstream segments on the wavelength and analyzing interference effects on the wavelength at the node;

a communicator for communicating the resulting performance matrix along the at least one downstream segment to the corresponding downstream node;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

50. (New) The apparatus of claim 49, wherein the previous performance value is received from along an OSC (Optical Service Channel) channel in the upstream segment.

51. (New) The apparatus of claim 49, wherein the resulting performance value is communicated along an OSC channel in the downstream segment.

52. (New) A computer-readable medium for storing computer-executable instructions which, when executed by a processor in a node in a communications network comprising a plurality of nodes interconnected by segments of optical fibre, cause the node to:

receive from an upstream node along a wavelength path a value of a performance matrix that identifies at least one performance metric measuring inference effects on a wavelength along a signal path;

determine the value of the performance matrix by analyzing interference effects on the wavelength in each of upstream segments on the wavelength and analyzing interference effects on the wavelength at the node;

determine if the resulting value of the performance matrix satisfies an acceptable threshold to determine the viability of the signal path;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

53. (New) A computer-readable medium for storing computer-executable instructions which, when executed by a processor in a transmitter node in a communications network, interconnected with at least one downstream node by a downstream segment along which it is adapted to send signals, cause the transmitter node to:

define a performance matrix by identifying at least one performance metric measuring interference effects on a wavelength along a signal path;

calculate a value of the performance matrix by analyzing interference effects at the node; and

communicate the resulting performance matrix along at least one downstream segment to the corresponding downstream node;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.

54. (New) A computer-readable medium for storing computer-executable instructions which, when executed by a processor in an intermediate node in a communications network, interconnected with at least one upstream node by an upstream segment from along which it is adapted to receive signals and with at least one downstream node by a downstream segment along which it is adapted to send signals, cause the intermediate node to:

receive from a upstream node along a wavelength path a value of a performance matrix that identifies at least one performance metric measuring inference effects on a wavelength along a signal path;

calculate the value of the performance matrix by analyzing interference effects on the wavelength in each of upstream segments on the wavelength and analyzing interference effects on the wavelength at the node;

communicate the resulting performance matrix along the at least one downstream segment to the corresponding downstream node;

wherein analyzing interference effects on the wavelength comprising the steps of identifying at least one optical effect that impacts the viability of the signal path, identifying at least one dominant source contributing to each identified interference effect, and identifying at least one base variable upon which each identified dominant source depends.